

Sand Equivalency

Sand Equivalency Test

Purpose

- To indicate the relative proportion of clay-like material (fine dust) to sand size particles in granular soil and fine aggregate that pass the No. 4 sieve.
- A higher sand equivalent value indicates that there is less clay-like material in a sample.
- For SCDOT , testing is only required for dry screenings.

Sand Equivalent Test

Test Procedures

- Specification
 - ASTM D2419
 - AASHTO T176

Sand Equivalent Test

Significance

- Clay-like materials have a direct effect on the performance of Hot Mix Asphalt and the amount should be controlled. A large amount of clay-like particles can coat the aggregate surfaces and prevent liquid asphalt cement from completely coating and adhering to the aggregate.

Sand Equivalent Test Required Test Frequency

Table 1. Required Minimum Aggregate Testing Frequency				
Test	Procedure	Materials	Value Range ⁽¹⁾	Min. Testing Frequency
Sand Equivalency (unwashed screenings only)	AASHTO T176	Stone (Non- Limestone)	45.0 & less	1 weekly
			Over 45.0	1 monthly
		Limestone	33.0 & less	1 weekly
			Over 33.0	1 monthly

⁽¹⁾This range will be determined for each source by the Geotechnical Materials Engineer based on the most recent individual test results from the supplier

Sand Equivalent Test Specifications

Material Use	Specification
Regular Screenings in Asphalt	40 Min
Limestone Screenings in Asphalt	28 Min
Limestone Crusher Run Fines	28 Min

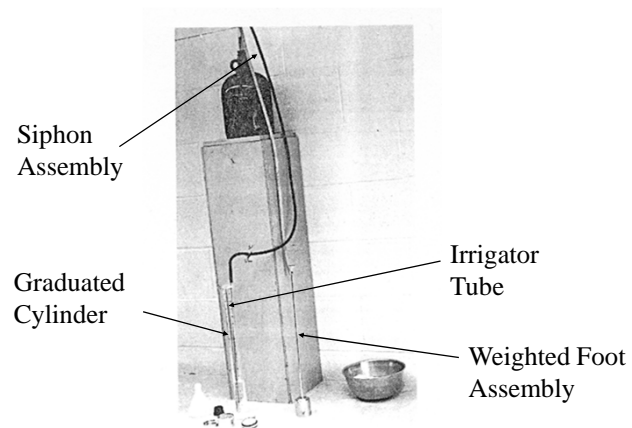
Sand Equivalent Test

Test Apparatus

- A plastic graduated cylinder with a rubber stopper
- Irrigation tube
- Weighted foot assembly
- Siphon assembly
- Tinned measure
- Wide-mouth funnel
- A clock or watch
- A mechanical or manual shaker
- Bottle of working solution

Sand Equivalent Test

Test Apparatus



Sand Equivalent Test

Sample Preparation

- The test is conducted on graded aggregate passing the No.4 sieve.
 - Any clumps or dust should be broken apart and included with the material passing the No. 4 sieve.
- Split sample enough to slightly overfill the 3 ounce tin measure 3-4 times.
 - Fill the 3 ounce tin cup making sure to tap the bottom edge of the measure against the top of the counter or work surface to help consolidate the material.

Sand Equivalent Test

Test Procedure

- Siphon 4.0 inches(+/- 0.1 in) of calcium chloride solution into the plastic cylinder, and pour the sample into the cylinder using the funnel.
 - Tap the bottom of the cylinder with the heel of your hand to release the air voids and to assure proper wetting and consolidation of the sample.
- Allow sample to stand for 10 (+/- 1) minutes.
- Loosen the material from the bottom of the cylinder by partially inverting and shaking.

Sand Equivalent Test

Test Procedure

- Shake the cylinder using the manual shaker for 100 strokes.
- Insert the irrigation tube and rinse the walls of the cylinder as the tube is lowered to the sample.
 - Force the irrigator completely through the material while applying a gentle stabbing and twisting motion.
 - Continue the stabbing and twisting motion until the cylinder is filled to the 15 inch (381 mm) mark.

Sand Equivalent Test

Test Procedure

- Allow sample to stand for 20 minutes (+/- 15 seconds).
- Read and record the level at the top of the suspended clay.
 - Record this as the Clay Reading.
- Carefully lower the weighted foot into the cylinder taking care not to hit the top or the cylinder walls and disturbing the sample.

Sand Equivalent Test

Test Procedure

- Read and record the level at the top edge of the indicator.
 - Subtract 10 inches(254 mm) from the reading to obtain the Sand Reading.
 - Always record the sand and clay readings to the next highest gradation level if the level is between lines.

Sand Equivalent Test

Test Procedure

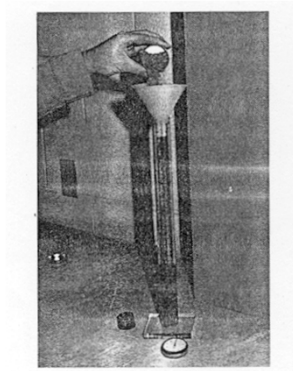
- Calculate the Sand Equivalency to the nearest 0.1 using the following formula.

$$SE = \frac{\text{Sand Reading}}{\text{Clay Reading}} \times 100$$

- NOTE: Always report the results to the next highest whole number.
 - Example 41.2 should be reported as 42.

Sand Equivalent Test

Test Procedure



Transfer of Sample from Measuring Tin to Cylinder

Sand Equivalent Test

Common Errors

- Calcium Chloride Solution
 - Not mixed properly. (85 +/- 5 ml per gallon of distilled water)
 - Used outside of the temperature range. (72° F +/- 5)
 - Not checked for organic growth.
 - Solution exposed to direct sunlight
- Vibrations or jarring while sample is settling out in the solution.

Sand Equivalent Test

Common Errors

- Improper sample preparations (splitting and test sample preparations).
- Sample not irrigated correctly.
- Sample not shaken properly in graduated cylinder.